covered thermometer rose rapidly till it nearly touched 94°, while the naked one remained stationary.

The conclusions to which these experiments point are too obvious to require demonstration. C. J. McNally

Madras, December 9, 1880

Selenium

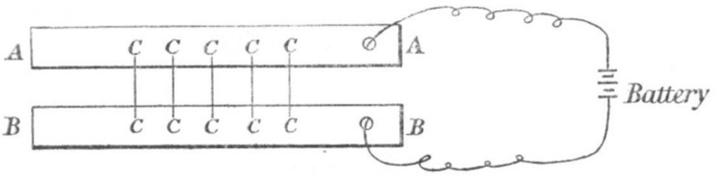
The use of selenium in the photophone has suggested to me the possibility of using it in two ways, which I shall now describe, thinking you may perhaps consider them of sufficient general interest to publish in Nature.

Firstly, it seems probable that selenium might be used to obtain the automatic registration in a chronograph of such phenomena as star transits. It possesses the property of being drawn into fine wire at a low temperature, but whether it can be drawn fine enough to represent transit wires in a telescope I do dot know.

The arrangement would be as shown in the diagram, where A A B B are parallel metal plates crossing the field of the telescope, and insulated from each other except by the selenium wires C C C C in one direction, and by a wire circuit passing through a battery, and a relay, R, in the other. The relay should be so adjusted that the increased force of the current passing through the circuit caused by the light of a star falling on each wire C C in succession, shall cause its armature to act, and pass on a signal to the chronograph.

The delicacy of the adjustment required for this purpose might be a greater difficulty than I am aware of; but it should be borne in mind that the length of selenium in the circuit may be very small, as the plates A A B B need not be farther apart than sufficient to insure the star's falling between them without excessive accuracy of setting, say one-twentieth to one-tenth of an inch in a telescope of moderate size. If necessary, it would be simple enough to give each wire C C its own distinct circuit. Should the brittleness of the wires prove a difficulty, they may be supported between the plates A A B B in any convenient way which does not interfere with the insulation of these plates.

The second purpose would perhaps be of more practical use than the above, viz. to secure an automatic daily time-signal.



Let a thin plate of selenium be placed between, and in firm contact with, two parallel plates of metal, which are connected with each other by a wire passing through a battery and a relay as above, so that the selenium alone interrupts the circuit. Then if this plate be placed with its length in the meridian, and a lens adjusted above it, so as to throw the image of a star, or the sun, as it crosses the meridian exactly on the selenium, a signal will be obtained from the relay as before, which in this case may be the stroke of a bell or any other convenient sound.

An ordinary lens would require constant changes of adjustment if used for the sun, moon, or any body of varying declination; but if the lens were the central slice cut out of a sphere by two small circles parallel to each other and equidistant from the centre, placed with its flat sides parallel to the meridian, while the selenium was placed in a curve concentric with that of the lens, at the proper distance from its surface, and of sufficient length—of course being accurately in the meridian—then any heavenly body of whatever declination—between certain wide limits—would throw its image on the selenium and afford a signal, if of sufficient brightness. The arrangement of a warning-signal would be easy.

If this method proved practicable the objection would remain of having to apply a correction to obtain mean time, which would probably prevent its being used for public purposes, such as dropping time-balls or firing time-guns. It seems to me however that it might nevertheless prove very useful to many private individuals who require an accurate knowledge of time.

Poona, December 3, 1880 W. M. C.

Experiments with Vacuum Tubes

At a meeting of the Philosophical Society of Glasgow on December 22, 1880, I gave a very brief preliminary account of some experiments that I have been making, along with Sir William Thomson, with vacuum tubes. We have sealed up English and German glass tubes with very high vacuums, but without any electrodes; and have obtained very remarkable luminous effects both with the Ruhmkorf coil and also working by means of electrostatic induction. Using an ordinary frictional electric machine, and applying one end of a long vacuum tube to the prime conductor, while the other end of the tube is held in the hand, the tube becomes charged as a double Leyden jar in the following way:—one end of the tube, next to the prime conductor,—outside positive, inside negative; the other end—inside positive, outside negative. This can be shown by the gold leaf electroscope. The charges seem to be very high and the glass is very frequently perforated. Indeed it is difficult to work with the electric machine in tolerably good order without perforating the glass. While this double Leyden jar is slowly discharged, by removing, part by part, the charges from the outside of the tube, beautiful luminous effects are observed very different from those seen in the ordinary vacuum tubes. We have also obtained curious effects by heating the middle region of the tube so highly that it becomes a semi-conductor. J. T. Bottomley

Physical Laboratory, University, Glasgow, December 29

Modern Use of Ancient Stone Implements

Perhaps the following statement will interest some of your readers:—In an old volume, "Thomae Bartolini Acta hafniensia," Ann. 1674, 1675, 1676, I find a paragraph signed by Olaus Borrichius, which clearly indicates that in the seventeenth century ancient stone implements, and probably many of them, were converted into flints for the use of the contemporaneous musquetry. The text runs thus:—"Silices Anholdini triangulares. Insula haec [Anholt in the Kattegat] porrigitur in sinu codano, minuta illa quidem et naufragiis multorum infamis, uno hîc laudanda quod si quis arenas littoris eiusdem scrutetur, infinitos reperiat silices nigros, albos, varios, in sabulo hinc inde sepultos, ad sex transversos digitos in longitudinem protensos, latos digitum unum, omnes triquetros ac si manu artificis fuissent acuminati, et lateribus plerumque in illam aciem excitatis, ut Iosuae servire potuerint cultris saxeis filiorum Israel circumcisionem imperanti. Nunc ferreo hic seculo in alios vocantur usus: malleo enim in frusta convenientia divisi sclopetorum rotulis ignem prompte ministrant et fomitis incendiarii loco fulmineis bellatorum tubis ancillantur." D. Budde

Rome, December 26, 1880

Pile Dwellings

If the connection between pile dwellings in the Swiss lakes, the Swiss châlet, and the Malayan modern pile dwellings is demonstrated, a decided advance has been or will be made in prehistoric anthropology.

Pile dwellings are a very distinct characteristic of all the Hill races north-east of Bengal, except those on the Kasia Hill ranges, and so far as I can see is a conspicuous distinction between the Aryan and non-Aryan races here.

The persistence with which this custom is retained among tribes who have migrated to new sites, where the need is not obvious, seems to offer a safe means of tracing to some extent racial descent or relationships.

The "Miris" of Asam offer a case where part of the tribe is still in its hills, while the rest are more or less scattered along the Brahmaputra in the level land of Asam, and build houses alike. The Ahoms, a Shan race who invaded and settled in Asam in A.D. 1228, built pile dwellings, and the "Deodhaings," who are lineally descended from them, do so now. The Butias

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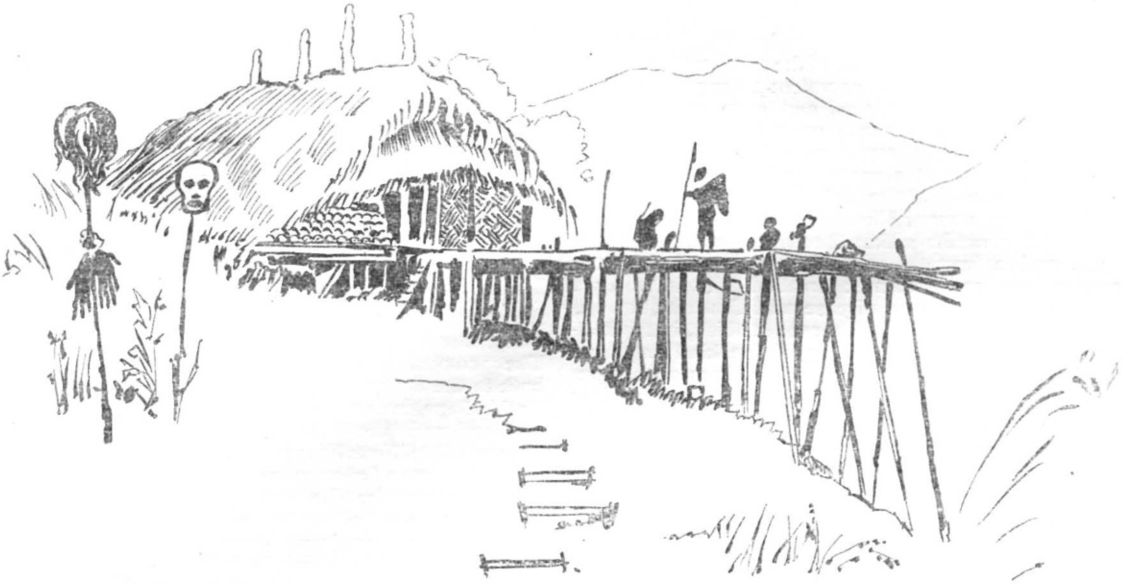
Daflas, Akas, Abors, Mishmis, Singphus, and Nagas (all) build pile-dwellings, as do the Kamtis.

Several peculiarities are noteworthy, *i.e.* that the custom is confined to *hill races,* and not seen in plain races; that the invariable explanation offered to inquiry is that on the hill tops and spurs, where *alone* the villages are built, there is very little level land; also that this form of house is a necessity among races that keep pigs and goats, which to any casual visitor is at once obvious.



As it is possible that this question may afford unexpected results when examined, I inclose sketch of a Naga "Morang," or skull house, which with its platform is the same as those they live in. Different tribes have variations of the pattern, and most have the platform balcony in some shape or other, and the posts go through the roof in some Nagas houses alone.

Asam S. E. Peal

Landslips.—The Cheshire Subsidences

Under the guidance of Mr. Thos. Higgin, F.L.S., and your correspondent Mr. Ward, I have just been examining the subsidences that have been lately taking place in the neighbourhood of Northwich. To understand how they occur, it is necessary to know that there are two beds of rock salt in the Triassic marl. The upper bed, 25 yards thick, is from 40 to 60 yards below the surface; the lower, 35 yards thick, is separated from the upper by about 10 yards of hard marl. The greater bulk of the salt is obtained in the form of brine pumped up from the upper bed. The lower bed is to a smaller extent worked as a salt-mine. From these operations two classes of subsidences result: the one general and gradual, due to the removal in solution of the rock salt of the upper bed by percolation of water and pumping, by which the surface of the ground sinks in undulations; the other, sudden fallings in of the ground into the mines, forming crater-like pits. It is to these I wish to call attention. I was fortunate enough to see one before it had become, as they all do, partially filled with water. I should judge it to be about 70 feet deep, 150 feet diameter at the top, and 20 or 30 feet at the bottom, where a little water was lodging. The problem to account for is how such an inverted cone of marl capped with boulder-clay and drift-sand could apparently have disappeared through so small a hole? The explanation appears to be this: By percolation of water the roof of the mine begins locally to give way and fall into the mine, gradually working its way to the surface, where it first appears in the form of a hole about the size of a well. The vacuity will no doubt take a conical form, the base being at the roof of the mine; once the hole is formed, the surface-ground begins to slip and fall in around, gradually enlarging the orifice, the material disappearing into the mine below. This continues until the bottom is filled up and the sides of the "crater" attain the angle of repose. The whole thing will occur in a night. The subsidences certainly present a very remarkable appearance from the regularity of their circular or elliptical form and funnel crater-like shape. It is evident such subsidences could not happen except under special conditions, such as are provided by salt-mining and pumping in these Keuper marls. T. Mellard Reade

Park Corner, Blundellsands, Liverpool, December 22, 1880

Animal Reasoning

I send an account of a singular act of animal intelligence which may not be uninteresting to the readers of Nature. A lady, a friend of mine, was at one time matron of a hospital for poor women and children which was maintained by subscription. One of the inmates was a blind girl who was there not as a patient, but temporally till a home could be found for her. She had learned to feed herself, and at meal times a tray containing her dinner was placed on her knees as she sat in a comfortable chair for her special convenience in feeding herself. One day while she was eating, the pet cat of the establishment placed herself before the girl and looked long and earnestly at her, so earnestly that the matron, fearing the animal meditated some mischief to the girl, took her out of the room. Again the next next day, at the same hour, the cat entered the room, but this time walked quietly to the girl's side, reared herself on her hind legs, and noiselessly, stealthily reached out her paw to the plate, selected and seized a morsel that pleased her, and, silently as she came, departed to enjoy her stolen meal. The girl never noticed her loss, and when told of it by her companions laughed very heartily.

It is evident that the cat from observation had entirely satisfied herself that the girl could not see, and by a process of reasoning decided she could steal a good dinner by this practical use of her knowledge. K. P.

Cambridge, Massachusetts

Ozone

The letter of J. P. on this subject hardly gives enough data to enable one to found an opinion upon; but is it not possible the paper is coloured by ozone from the air? It is well known that a flame is the most potent method of collecting atmospheric electricity, and a properly-insulated spirit flame ignited in dry air seldom fails to show some traces. I would suggest the experiment being repeated on the exposed plate of a gold leaf electrometer, the surrounding conditions of place, air, &c., being noted: also under a bell glass, where such conditions would be varied. Ozone is very strong just now, my paper this morning reaching 10, the limit of Negretti and Zambra's scale. J. Rand Capron

Guildown, December 28, 1880

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